

English translation of claims of  
Japanese Laid-open patent application JP-A-1986041437

**【DOCUMENT NAME】 Specification**

**1. TITLE OF THE INVENTION**

A Cardio-monitoring Device

**2. CLAIM**

(1) A cardio-monitoring device displaying cardiograms in a time-series manner on a two-dimensional display screen and capable of detecting an abnormal waveform, wherein a mark display part is situated at a predetermined position, and wherein a mark display part for an abnormal waveform is displayed in a different form from a mark display part for a normal waveform.

**3. DETAILED DESCRIPTION OF THE INVENTION**

**(イ) Field of the invention**

This invention relates to a cardio-monitoring device, more specifically to a cardio-monitoring device with an abnormal waveform detecting function.

**(□) Conventional art**

Usually, when a patient who has abnormalities in the heart and is in a very dangerous state, the patient is received in ICU, CCU, etc. and an electrocardiogram is supervised continuously in a hospital. A cardio-monitoring device is used for such monitoring. The monitoring device continuously displays cardiograms on a monitor such as CRT and the like, and gives sound alarm whenever an abnormal waveform(s) appear on the monitor.

**(ハ) Problem to be solved**

The conventional monitoring devices described in the above has the following disadvantage that if abnormal waveform is detected, since only sound alarm is given, when two or more cardiogram waveforms continue, it glances at which waveform was detected as an abnormal waveform and the abnormal waveform is unknown. It is, therefore, a person who monitors the waveforms can not reconfirm the abnormal waveform. Additionally in detection of an abnormal waveform, when the device can change a detection parameter, it is also difficult to confirm the accuracy and reliability of abnormal waveform detection.

The aim of the present invention is to provide a cardio-monitoring device which solve the above-stated problems and enable to readily identify which waveform on a monitor is abnormal as well as reconfirming the identified waveform.

**(二) Means for solving the problem and function**

The cardio-monitoring device in accordance with the present invention, a mark display part is situated at a predetermined position, wherein a mark display part for an abnormal waveform is displayed in a different form from a mark display part for a normal waveform.

In this cardiogram monitoring device, if an abnormal waveform is detected during the display of an electrocardiogram, a mark with different form from the normal waveform(s) will be displayed on a mark display part of the position corresponding to the abnormal waveform. By checking the waveform corresponding to the mark with different form displayed on such mark display part, immediate recognition and reconfirmation of the normal waveform can be made.

(ホ) Embodiment of the invention

Fig. 1 is a block diagram of a cardiogram measuring system according to an exemplary embodiment of the present invention. In the drawing, cardiogram signals from the human body are amplified and modulated with a telemeter transmitter 1 and is transmitted therefrom. The cardiogram signals thus transmitted from the transmitter 1 are received with a telemeter receiver 2, and the received signals are decoded and amplified by a decoding/amplifier 3. The amplified signals are converted into digital signals by a filter · A/D converter 4 and are stored in a RAM 6 under the control of a CPU 5. A ROM 7 is a memory for previously storing a program(s) controlling the CPU 5.

The cardiogram signals sent in order of time from the transmitter 1 are sequentially stored in the RAM 6 and is input to a CRT (monitor) 9 for displaying cardiogram waveforms on its two dimensional display screen in a sequential manner.

Fig. 2 is an example of displayed waveforms of cardiogram on the CRT 9. In the drawing, waveforms A, B D and E show normal cardiograms. During the detection of these waveforms, normal waveform marks 11, 12, 13 and 14 indicated by "▽" are displayed on upper part of the respective waveforms. On the other hand, when an abnormal waveform cause by abnormal cardiac rhythm, for example, is detected, an abnormal waveform mark 15 indicated by "▼" is displayed on a corresponding position of the abnormal waveform. The person who conducts measurement readily recognizes which waveform is abnormal one. In addition, the person can recognize which is an abnormal waveform by using the abnormal mark as a mark to find out abnormal one. Especially, it is sometimes difficult to recognize both normal and abnormal

waveforms intuitively only by comparing directly when an abnormal waveform(s) is similar to a normal waveform(s). In that case, display of the abnormal waveform mark is advantageous.

By checking how different the waveform with the abnormal mark from normal waveforms, it is possible to check that the normal wave is not detected correctly if the marked waveform(s) is identical with the normal waveform(s).

Fig. 3 is a flowchart illustrating processes of abnormal detection carried out by a system according to the exemplary embodiment and that of display on the CRT i.e. monitoring device. Once the process starts, a judgment in which whether or not any QRS complex exists, is carried out in step ST1. When existence of QRS is detected, subsequently, the width and area of the QRS complex is calculated (step ST2). After the calculation, the width and area of QRS of the normal wave previously calculated are compared with that of the QRS currently measured, and a judgment whether or not the current waveform is an abnormal QRS is carried out (step ST3).

If the current waveform is not an abnormal QRS, i.e. a normal waveform, a normal waveform mark "▽" is added to upper display position of the QRS (step ST4). Processes from step St1 through ST4 are carried out repeatedly whenever QRS of each waveform is detected.

When the current waveform is judged as an abnormal QRS as a result of the judgment in step ST3, in other words, when the process proceeds to "YES" in the step ST3, an abnormal waveform mark "▼" is added to upper display position of the QRS (step ST5).

Thereafter, processes from step St1 through ST5 are carried out repeatedly similar to the above in chronological order. That is, cardiogram waveforms

are displayed left from right as a result of chronological order. On the upper part of QRS of the each waveform, a normal waveform mark(s) "▽" and an abnormal waveform mark "▼" are respectively added as appropriate. Under the circumstances, the person who conducts measurement can recognize whether each waveform is a normal waveform and whether it is an unusual waveform by looking at display situation of the marks on the mark display part.

Both the marks "▽" and "▼" are used to identify either the normal waveform or the abnormal waveform on the mark display part in the above-described embodiment. These marks are not limited to the marks "▽" and "▼", any other means to identify the normal waveform and the abnormal waveform, for example, change in color of the mark display part, change in the mark itself or display totally different character(s) can be employed in the present invention. In other words, any display enabling the difference between the normal waveform and the abnormal waveform can be used.

Alternatively, any other two-dimensional display can be used for the CRT for monitoring waveforms.

#### (^) Advantages of the present invention

According to the cardiogram monitoring device in accordance with the present invention, when an unusual waveform is detected during the monitoring of cardiogram, the mark which shows that the waveform is an abnormal wave is displayed on an upper part of the abnormal waveform. Such mark is displayed in a different form immediate after the detection of the abnormal waveform. Consequently, the person who conducts the measurement can easily recognize the existence of the abnormal waveform and its position. Reconfirmation of such abnormal waveform can be

performed easily abnormalities arise.

**【Brief description of the drawings】**

**【Fig. 1】**

FIG. 1 is a block diagram of a cardiogram measuring system according to an exemplary embodiment of the present invention;

**【Fig. 2】**

FIG. 2 is an example of displayed waveforms of cardiogram on the CRT.

**【Fig. 3】**

FIG. 3 is an exemplary vertical display of a heart beat/trend graph and an event waveform according to this embodiment.

**【Description of the reference numerals】**

- 1 . . . . .telemeter transmitter
- 2 . . . . .telemeter reciever
- 3 . . . . .decoding/amplifier
- 4 . . . . .filter . A/D converter
- 5 . . . . .CPU
- 6 . . . . .RAM
- 7 . . . . .ROM
- 8 . . . . .CRT interface
- 9 . . . . .CRT
- A . B . . . . E cardiograms
- 11 . 12 . 13 . 14 normal waveform mark
- 15 . . . . .abnormal mark

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## DRAWINGS

Fig.1

- 1 telemeter transmitter
- 2 telemeter receiver
- 3 decoding/amplifier
- 4 filter · A/D converter
- 5 CPU
- 6 RAM
- 7 ROM
- 8 CRT interface
- 9 CRT

Fig.3

Start

ST1 any QRS complex exists

ST2 calculate width and area of QRS

ST3 abnormal QRS?

ST4 normal waveform mark “▽” is added

ST5 abnormal waveform mark “▼” is added

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審査請求 未請求 発明の数 1 (全4頁)

⑮ 発明の名称 心電モニタ装置

⑯ 特 願 昭59-163335

⑰ 出 願 昭59(1984)8月1日

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## 明 細 書

## 1. 発明の名称

心電モニタ装置

## 2. 特許請求の範囲

(1) 二次元表示器の画面上に、時系列的に心電図を表示するとともに、異常波形を検出可能な心電モニタ装置において、

各波形の所定位置に、マーク表示部を設け、異常波形のマーク表示部は、正常波形のマーク表示部と異なる態様で表示するようにしたこと

を特徴とする心電モニタ装置。

## 3. 発明の詳細な説明

(1) 産業上の利用分野

この発明は心電モニタ装置、特に異常波形の検出機能を持つ心電モニタ装置に関する。

(2) 従来の技術

病院では一般に心臓に異常があり、また非常に危険な状態にある患者がいるときはICU、CCU等にその患者を収容し、連続して心電図の監視を行なうのが通常である。この心電図の監視に使

用されるのが心電モニタ装置であり、従来はこの種の装置は心電図を連続してCRT等のモニタ上に写し出し、異常波形が現われるとその度に警報音を鳴らしていた。

(3) 発明が解決しようとする問題点

しかし、上記した従来の心電モニタ装置は、単に異常波形が検出されると警報音を鳴らすだけであるから、複数の心電図波形が連続する場合、どの波形を異常として検出したのか一見してはわからないため監視している者が再確認できないという欠点があつた。また異常波形の検出において、検出パラメータの変更が可能な装置の場合に、異常検出の精度や信頼性を確かめることも困難であるという問題があつた。

この発明は、これらの問題点を解消し、異常波形が検出されると、それがモニタ上のどの波形であるのか直ちにわかるようにし、さらに再確認が可能である心電モニタ装置を提供することを目的としている。

(4) 問題点を解決するための手段及び作用





部の表示状況を見て、各波形が正常波形なのか異常波形なのか知ることができる。

なお上記実施例において、各波形の正常・異常を区別するマーク表示部は、▽印と▼印で行なっているが、この発明ではマーク表示は▽印と▼印に限られるものではなく、正常波形と異常波形を区別するのにマーク表示部の色を変えたり、あるいはシンボルを変えたり、また異なる文字を表示する等、要するに正常波形と異常波形の表示態様を異ならせるものであれば何であつてもよい。

また、上記実施例のモニタ用のCRTに代えて、他の二次元表示器を用いてもよい。

#### ハ 発明の効果

この発明の心電モニタ装置によれば、心電図を監視している中で異常波形が検出されると、これを示すマーク表示がその異常波形の上方に、直ちに正常波形のマーク表示と異なる態様で表示されるので、測定者は簡単にその存在、及びその位置を知ることができ、異常が起つた場合に、波形の再確認を容易にすることができるという利点がある。

る。

#### 4. 図面の簡単な説明

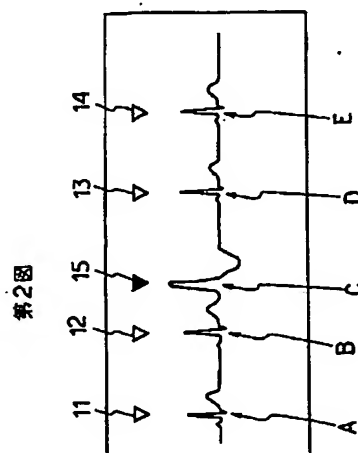
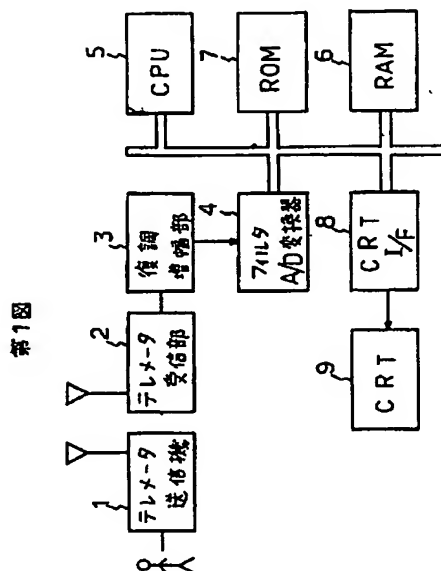
第1図はこの発明の一実施例を示す心電図測定システムのブロック図、第2図は同心電図測定システムのCRTに表示される画面の1例を示す図、第3図は同実施例心電図測定システムの異常検出処理及び表示処理の手順を示すフローチャートである。

1: テレメータ送信機、 2: テレメータ受信部、 3: 復調・増幅部、 4: フィルタ・A/D変換器、 5: CPU、 6: RAM、 7: ROM、 8: CRTインタフェース、 9: CRT、 A・B・……・E: 心電図、  
OK 1 1・1 2・1 3・1 4: 正常波形表示マーク、  
1 5: 異常波形表示マーク。

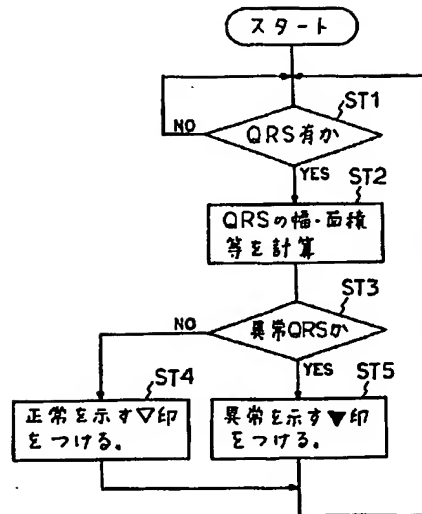
特許出願人

立石電機株式会社

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第3図



**Family list**

**1** family member for:

**JP61041437**

Derived from 1 application.

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**1 ELECTROCARDIOGRAPH MONITOR APPARATUS**

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